AMENDMENTS TO THE CLAIMS

1-4. (Canceled)

5. (Currently Amended) A multiplexing QAM demodulation apparatus <u>adapted to demodulate</u> ~~which demodulates~~ a reception signal of a multiplexed QAM-modulated wave transmitted from a multiplexing QAM apparatus and <u>determine</u> ~~determines~~ a plurality of differential-gain-multiplexed input data, comprising:

    a probability calculating unit <u>adapted to calculate</u> ~~that calculates~~ probabilities <u>of the</u> ~~that said~~ reception signal <u>corresponding</u> ~~corresponds~~ to respective symbol positions<u>,</u> based on variance of symbol positions caused by a transmission line; ~~and~~

    <u>an expectation value calculating unit adapted to calculate an expectation value of each of the plurality of differential-gain-multiplexed input data based on the calculated probabilities;</u>

    a demodulation unit <u>adapted to estimate</u> ~~that calculates an expectation value of each of said plurality of differential-gain-multiplexed input data, based on said probabilities that said reception signal corresponds to said respective symbol positions, and estimates said~~ <u>a</u> <u>multiplexed</u> input data based on <u>an</u> ~~said~~ expectation value of said <u>multiplexed</u> input data<u>; and</u>

    <u>wherein said demodulation unit is adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing and then estimate remaining input data while eliminating improbable symbol positions from the estimated multiplexed input data.</u>

6. (Canceled)

7. (Currently Amended) A multiplexing QAM demodulation apparatus <u>adapted to demodulate</u> ~~which demodulates~~ a reception signal of a multiplexed QAM-modulated wave transmitted from a multiplexing QAM apparatus and <u>determine</u> ~~determines~~ a plurality of differential-gain-multiplexed input data, comprising:

    a judgment unit <u>adapted to estimate</u> ~~that estimates~~ individual symbol positions which appear in <u>a</u> ~~the~~ received multiplexed QAM-modulated wave based on both a symbol position arrangement of said multiplexed QAM-modulated wave and a characteristic of a transmission line<u>;</u>~~,~~

    <u>wherein the judgment unit is adapted to determine</u> ~~determines~~ a most probable symbol position based on distances between the estimated individual symbol positions and a symbol position of said reception signal<u>;</u> ~~, and then~~

    <u>wherein the judgment unit is adapted to determine a</u> ~~determines said~~ plurality of input data from the determined <u>most probable</u> symbol position<u>; and</u>

    <u>a demodulation unit adapted to first estimate said multiplexed input data having been given a larger modulated wave gain in multiplexing and then estimate remaining input data while eliminating improbable symbol positions from the estimated multiplexed input data.</u>

8. (Currently Amended) ~~A~~ The multiplexing QAM demodulation apparatus according to claim 7, wherein the apparatus ~~which demodulates a reception signal of a multiplexed QAM-modulated wave transmitted from a multiplexing QAM apparatus and determines a plurality of differential-gain-multiplexed input data,~~ further comprising:

a training unit that receives a prescribed training signal transmitted from said ~~multiplexing QAM~~ apparatus during an initialization period of signal transmission:~~, and~~

wherein the training unit is adapted to determine ~~determines~~, based on said training signal, and by operating with said ~~multiplexing QAM~~ apparatus, at least one parameter among:

a QAM value of respective QAM-modulated waves to be differential-gain-multiplexed into said multiplexed QAM-modulated wave;

a gain difference between said QAM-modulated waves; and

a phase difference between said QAM-modulated waves, so that a proper inter-symbol distance of said multiplexed QAM-modulated wave can be secured after the reception.

9. (Canceled)

10. (New) The multiplexing QAM demodulation apparatus according to claim 5, wherein the apparatus further comprising:

a training unit that receives a prescribed training signal transmitted from said apparatus during an initialization period of signal transmission;

wherein the training unit is adapted to determine, based on said training signal and by operating with said apparatus, at least one parameter among:

a QAM value of respective QAM-modulated waves to be differential-gain-multiplexed into said multiplexed QAM-modulated wave;

a gain difference between said QAM-modulated waves; and

a phase difference between said QAM-modulated waves, so that a proper inter-symbol distance of said multiplexed QAM-modulated wave can be secured after the reception.